

DuoFlow pH Monitor

Catalog Number 760-2040

The BioLogic pH monitor is an in-line electrode and flow cell that provides direct monitoring of pH conditions during a sample run. It provides real-time monitoring of buffer pH and is designed for flow through pH recordings. The pH monitor is available as an option to the BioLogic DuoFlow systems and is compatible with the discontinued BioLogic HR systems. The monitor ships with all Maximizer systems.

The monitor is supplied with a tubing kit that includes installed $\frac{1}{4}$ -28 fittings. When used with either a DuoFlow or HR system the pH monitor connects via the Signal Import Module (SIM). When a Maximizer is installed with the DuoFlow Workstation the monitor connects directly to the system via a BNC port on the Maximizer.

The pH electrode is a sealed Calomel combination electrode consisting of a pH and a reference electrode built into a single body. The sealed reference design eliminates the need to add electrolyte solutions and minimizes reference dry out. The pH electrode is fully compatible with buffers (such as Tris) that may not be compatible with Ag/AgCl containing electrodes. The pH Monitor is designed for use in chromatography applications at flow rates up to 80 ml/min and a flow cell pressure less than 75 psi.

The flow cell is made of PEEK and has a swept volume of approximately 80ul when the pH electrode is inserted.

These instructions cover the installation, calibration, and maintenance of the pH electrode and flow cell. Be sure to keep this information with your BioLogic DuoFlow or HR instruction manual for future reference.

Installation Instructions

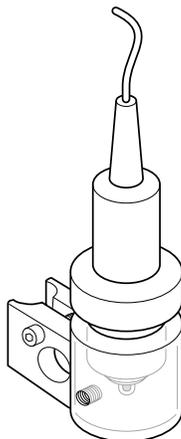


Figure 1. pH Electrode and Flow Cell

The flow cell and pH electrode should be plumbed downstream of any backpressure device or detector. The pH Monitor has a maximum pressure rating of 75 psi.

Instructions for first time use

During shipment, the air bubble in the electrode's stem may have moved into the bulb area. If bubbles are seen in the bulb area, hold the electrode by its top cap and shake downwards, as is done with a clinical thermometer.

Do not expose the electrode to extreme pH solutions for prolonged periods of time, doing so will severely shorten the lifespan of the electrode.

Before you install the pH electrode in the flow cell hydrate the pH bulb and reference junction by removing the electrode protector boot and immersing the lower end of the electrode into distilled water or a pH 4.0 buffer for 30 minutes.

Assembling and Installing your pH Monitor

The flow cell is equipped with a mounting bracket for easy attachment to any system. The tilt of the flow cell inhibits bubble formation.

1. Mount the flow cell to the DuoFlow rack using the mounting bracket. If a UV detector and Conductivity monitor are being used we recommend attaching them to this same bracket.
2. Plumb the flow cell from its inlet (lower port) to the Conductivity monitor using the orange (0.02" ID) PEEK tubing supplied with the pH monitor. Connect the outlet port to your fraction collector. Both ports are threaded for use with 1/4-28 fittings. If you anticipate high flow rates that create high backpressure, install the green (0.03" ID) PEEK tubing.
3. Ensure that the black o-ring is in the flow cell and the red o-ring is on the lower half of the pH electrode.
4. Insert the pH electrode into the top of the flow cell and hand tighten the nut until some resistance is encountered. Do not over tighten.
5. Attach the BNC connector from the pH electrode to the Maximizer or SIM, see figures 2 and 3.

Plumb the flow cell downstream of any backpressure device since the pH probe has a maximum pressure rating of 75 psi.

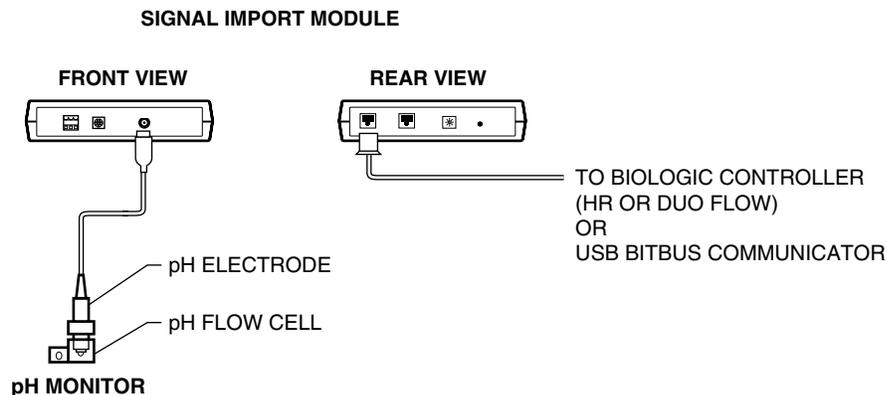


Figure 2. pH Monitor connected via SIM module for BioLogic DuoFlow without a Maximizer system

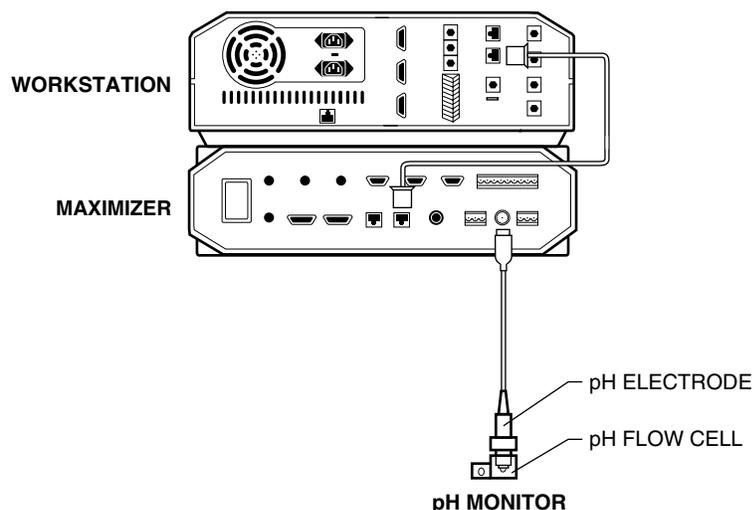


Figure 3. pH Monitor connected via a DuoFlow Maximizer.

Programming your pH Monitor

See the DuoFlow instruction manual for instructions on programming your pH Monitor.

Calibrating your pH Monitor

The frequency of calibration is a function of the electrode and the solutions it is exposed to. The pH electrode calibration should be checked daily to assure that its accuracy remains within the range required for your application. Calibration is done with two standard solutions that span the pH range over which your experiment will be run (for example pH 7 and 4 or pH 7 and 10). Following is a calibration procedure:

Calibration procedure

1. Remove the electrode from the flow cell.
2. Rinse the electrode with deionized water.
3. Place the electrode in the first calibration buffer.
4. From the Utilities drop down menu in the DuoFlow software, select "pH probe calibration".
5. Enter the temperature from the pH probe calibration screen and reference pH for your first buffer. Press Set.
6. When the pH reading has stabilized, press Okay.
7. Remove the electrode from the buffer and rinse with deionized water.
8. Place the electrode in the second calibration buffer.
9. Enter the reference pH for the second buffer. Press set.
10. When the pH reading has stabilized, press Okay.

Hint: Keep calibration and elution buffers at the same temperature. This will eliminate the need to correct values for temperature effects. Allow sufficient time for the pH reading to stabilize. In general, buffers at low concentrations take longer to stabilize. Do not expose the electrode to extreme pH solutions for prolonged periods of time. Doing so will severely shorten the lifespan of the electrode.

Maintenance of your pH Monitor

All pH electrodes age with time. Aging is characterized by slower speed of response or drifting. Your electrode should typically have specific voltage readings at different pH's as specified in the chart below.

Standard solution	Voltage
pH 7	0 ± 30 mV
pH 10	-171 ± 30 mV

If your electrode differs significantly from the above reading, clean the electrode according to the following directions. If performance is not restored, then the electrode should be replaced.

Electrode Cleaning

A dirty pH electrode can lead to erroneous pH readings and shorten the lifetime of the electrode. Most contaminants will be either proteins that have adsorbed onto the glass membrane or buffer and salt crystals that have blocked the pH probe pores.

Removal of protein deposits: Immerse the electrode in a 1% solution of proteases, such as trypsin or pepsin, in 0.1M HCl for no more than 5 minutes. Rinse with deionized water to remove all traces of HCl.

Removal of salt deposits: Immerse the electrode in 0.1M HCl for 5 minutes followed by 0.1M NaOH for 5 minutes and then 0.1M HCl for 5 minutes. Rinse the electrode with deionized water to remove all traces of HCl.

Storing Your pH Electrode Between Uses

When pH readings are made infrequently (i.e., several days or weeks apart), the electrode should be stored in its plastic bulb filled with electrode storage solution (available from VWR or Orion) or pH 4 buffer in 3.5 M potassium chloride.

Do Not Allow the Electrode to Dry Out.

Trouble Shooting

Symptom	Possible Cause	Possible Solution
Noisy or unstable Readings	Air bubble on membrane	Remove air bubble
Drift	Solution temperature is changing	Allow all solutions to come to thermal equilibrium.
Leakage around pH probe	Loose nut	Tighten pH electrode nut
Leakage around pH probe	Missing or damaged o-rings	Replace o-rings
Leakage around fittings	Loose fitting	Tighten fitting
Leakage around fittings	Cracked or loose ferrule	Replace fitting

Technical Assistance

For additional help, contact your local Bio-Rad representative. In the United States, call Chromatography Technical Support at 1-800-4BIORAD.

Ordering Information

760-2040	DuoFlow pH Monitor
760-2042	pH Electrode
760-2044	Flow Cell
750-0502	Signal Import Module
910-1828	o-ring, pH flow cell, size 2-009
910-3014	o-ring, pH electrode, size 2-018
760-2046	BioLogic pH Monitor tubing kit – for connection between Conductivity flow cell and pH flow cell inlet includes
	1 x 28 cm 1/16" OD x 0.02" ID orange PEEK, rated to 5000 psi
	1 x 28 cm 1/16" OD x 0.03" ID green PEEK, rated to 3000 psi

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